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Introducing the auxilliary quantities m and θ such that

$$D = m\cos\theta \qquad \text{and } L = m\sin\theta$$

we have

$$\sin(\theta + y_2) = \frac{m^2 + (a_2^2 - a_1^2)}{2ma_2},$$

$$\sin(\theta + y_1) = \frac{m^2 - (a_2^2 - a_1^2)}{2ma_1};$$

whence are found two values for y_2 and y_1 respectively: these values of course become imaginary when the sine of $\theta + y_2$ or y_1 exceeds unity.

SOLUTION OF PROBLEM ON PAGE 40, *NUMBER* 2.

BY PROF. WILLIAM WOOLSEY JOHNSON, ANNAPOLIS, MD.

Two parabolas may be passed through four given points. The *directions* of their axes may be found by the following method given in Newton's Universal Arithmetic. Call the points A, B, C and D, join AB, BC, and CD; through A draw a parallel to CD, and through D a parallel to BC meeting the last parallel in M, and meeting AB in N. Construct a mean proportional to DM and DN, and lay it off in both directions from D on the line DM, the lines joining A with the points so found will be parallel to the axes of the two parabolas which may be passed through A, B, C, and D. [These directions may also be found by producing AB and CD to meet in O, laying off from O on OA a mean proportional to AO and OB, and on OD in both directions a mean proportional to OD and OC, the lines joining the points so found will have the required directions.]

Having selected the direction of the axis, the solution may be completed as follows; produce BC to meet the diameter already drawn through A, produce AB to meet a diameter through D; join these points of intersection, and produce CD to meet the joining line, the line joining this last intersection with A will be a tangent to the required parabola. [This is an application of Pascal's Theorem, the hexagon being reduced to three chords, two diameters, or chords meeting the curve at infinity, and a tangent.] A tangent at one of the other points, say D, may now be drawn by bisecting the chord AD with a diameter, since the tangents at D and A will meet this diameter in the same point. Having now the tangents at A and D, lines making at A and D the same angles with these tangents which the latter make with the diameters, will meet in the focus. Hence the axis may be found; and, bisecting a subtangent, the vertex.